

**REMARKS**

In the Office Action dated May 31, 2007, the Examiner (1) rejected claim 11 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,785,292 to Vogel ("Vogel") in view of U.S. Patent No. 6,940,874 to Ruszczyk et al. ("Ruszczyk"); and (2) rejected claims 39, 41-46, and 48-57 under 35 U.S.C. §103(a) as being unpatentable over Ruszczyk in view of U.S. Patent No. 6,041,051 to Doshi et al. ("Doshi"). Applicant respectfully traverses these rejections.<sup>1</sup>

Claims 11, 39, 41-46, and 48-57 are currently pending.

**1. Rejection of claim 11 under § 103(a)**

Claim 11 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Vogel in view of Ruszczyk. Applicant respectfully traverses this rejection.

Claim 11 recites:

A method of scheduling cable modems in a broadband communications system, comprising:

- receiving bandwidth allocation requests from the cable modems;
- for each of the bandwidth allocation requests, determining a mini-slot size based on a modulation and symbol rate associated with a respective bandwidth allocation request;
- scheduling transmission on a physical upstream channel from cable modems associated with each of the bandwidth allocation requests based on a respective mini-slot;

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<sup>1</sup> As Applicant's remarks with respect to the Examiner's rejections are sufficient to overcome these rejections, Applicant's silence as to assertions by the Examiner in the Office Action or certain requirements that may be applicable to such rejections (e.g., whether a reference constitutes prior art, motivation to combine references, assertions as to dependent claims, etc.) is not a concession by Applicants that such assertions are accurate or such requirements have been met, and Applicants reserve the right to analyze and dispute such assertions/requirements in the future.

segregating the physical upstream channel into multiple virtual upstream channels, wherein each of the multiple virtual upstream channels is associated with a different modulation and symbol rate;

grouping the cable modems into a plurality of groups; and  
assigning a different one of the multiple virtual upstream channels to each of the plurality of groups for upstream transmission.

Vogel and Ruszczyk, whether taken alone or in any reasonable combination, do not disclose or suggest the combination of features of claim 11.

For example, Vogel and Ruszczyk do not disclose or suggest at least “determining a mini-slot size based on a modulation and symbol rate associated with a respective bandwidth allocation request,” as recited in claim 11. In rejecting claim 11, the Office Action (pg. 2-3) cites to column 7, lines 24-26 and lines 28-36, and column 9, lines 20-26 of Vogel for allegedly disclosing various features of the claims.

At column 7, lines 24-36, Vogel discloses:

The upstream channel may be viewed as time-divided into a stream of mini-slots. A mini-slot is used as a unit of granularity for upstream transmission opportunities. A CM 28 is permitted to transmit on an upstream channel during a transmission mini-slot allocated by the CMTS 30. When a CM 28 wishes to transmit data it must first request permission from the CMTS 30. The CMTS 30 receives requests from a selection of cable modems that wish to transmit and may allocate one or more transmission mini-slots to each of the cable modems. The cable modems alternately transmit during the mini-slots. Mini-slots are timed to prevent collisions between the transmissions from different cable modems.

This section of Vogel discloses the allocation of mini-slots to a requesting cable modem based on a request message sent from the cable modem. This section of Vogel does not disclose, or have anything to do with, the determination of a mini-slot

size based on a modulation and symbol rate associated with a bandwidth allocation request, as recited in claim 11.

At column 9, lines 20-26, Vogel discloses:

Additionally, data packets that are transmitted in adjacent mini-slots may be transmitted according to different transmission formats for the RF interface 52. The formats are associated with parameters for data transmission. In one exemplary preferred embodiment of the present invention, the parameters for upstream data transmission include the symbol rate, the upstream channel frequency, the modulation type, the preamble, and Forward Error Correction ("FEC") parameters as described in Table 3.

This section of Vogel discloses the transmission of data in adjacent mini-slots with different transmission formats. However, this section of Vogel does not disclose, or have anything to do with, determining a mini-slot size. Therefore, Vogel does not disclose or suggest "determining a mini-slot size based on a modulation and symbol rate associated with a respective bandwidth allocation request," as recited in claim 11.

Ruszczyk does not cure the deficiencies of Vogel, and the Examiner does not allege that Ruszczyk discloses or suggests "determining a mini-slot size based on a modulation and symbol rate associated with a respective bandwidth allocation request," as recited in claim 11.

In view of the remarks above, Applicant submits that Vogel and Ruszczyk, whether taken alone or in any reasonable combination, do not disclose or suggest the combination of features recited in claim 11. Applicant respectfully requests that the rejection of claim 11 under § 103(a) be withdrawn.

**2. Rejection of claims 39, 41-46, and 48-57 under 35 U.S.C. §103(a)**

Claims 39, 41-46, and 48-57 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Ruszczyk in view of Doshi. Applicant respectfully traverses this rejection.

Claim 39 recites:

A method, comprising:

grouping cable modems into a plurality of groups, wherein the cable modems are grouped into the plurality of groups based on a latency associated with each of the plurality of groups; and

assigning a different virtual upstream channel to each of the plurality of groups, wherein each virtual upstream channel is associated with a different modulation, symbol rate or preamble.

The Examiner admits that Ruszczzyk does not disclose or suggest grouping cable modems based on a latency associated with each of the plurality of groups. (Office Action, p. 4.) The Office Action, however, alleges (p. 4) that Doshi, in col. 31, lines 7-10 (claim 34), discloses “grouping cable modems based on propagation delay.” Doshi, however, does not disclose “grouping cable modems based on propagation delay,” as the Examiner asserts. Claim 34 of Doshi recites:

The method in accordance with claim 33 wherein one of said control and signaling messages is a ranging message, said ranging message transmitted upstream within said superslot in said USC region, said ranging message utilized to compensate for propagation delay differences between a group of cable modems and said headend within said network.

First, claim 34 relates to “a group,” not a “plurality of groups,” as recited in claim 39.

Further, the section of the written description corresponding to claim 34 is at column 16, lines 32-40. In fact, the only two places where “propagation delay” is mentioned are in claim 34 and at column 16, line 35. Column 16, lines 32-40, of Doshi sheds light onto the meaning of claim 34 (underline added here):

Each two consecutive MAPs for an upstream channel are separated in time by the duration of one frame. Frame duration is selected to be slightly longer than the round trip propagation delay between

the headend and the furthest cable modem, plus the processing time needed for MAP generation at the HE, plus the processing time needed at the CM to interpret the MAP. Therefore, the MAP for each upstream frame is guaranteed to arrive at each cable modem within the next upstream frame. As a consequence of the combination of a rapid report time for MAP information and the distribution over time of MAP generation at the HE, streamlined and efficient control over the operation of the medium access control (MAC) for a plurality of upstream channels associated with one downstream channel is maintained.

Claim 34 (e.g., column 31, lines 7-10) and column 16, lines 32-40 Doshi merely disclose a frame duration based on a propagation delay. Doshi simply does not disclose “grouping cable modems based on propagation delay,” as the Examiner alleges. Therefore, Doshi also does not disclose “grouping cable modems into a plurality of groups, wherein the cable modems are grouped into the plurality of groups based on a latency associated with each of the plurality of groups,” as recited in claim 39.

In view of the remarks above, Applicant submits that Ruszczyk and Doshi, whether taken alone or in any reasonable combination, do not disclose or suggest the combination of features recited in claim 39. Applicant respectfully requests that the rejection of claim 39 under § 103(a) be withdrawn.

Claims 41-45 depend on claim 39 and include all the features of claim 39. Therefore, claims 41-45 are allowable over Ruszczyk in view of Doshi for at least the reasons set forth above with respect to claim 39. Therefore, Applicant respectfully requests that the rejection of claims 41-45 under § 103(a) be withdrawn.

Furthermore, claims 41-45 recite additional features not disclosed or suggested by Ruszczyk or Doshi. For example, claim 41 recites “differentiating slower cable modems from faster cable modems” and “assigning bandwidth to the cable modems based on the

differentiation such that the slower cable modems are allowed to transmit data proportionately more frequently than faster cable modems.” The Office Action (pp. 4-5) cites to column 7, lines 43-66 and column 8, lines 49-56 of Ruszczyk for allegedly disclosing these features.

At column 7, lines 43-66, Ruszczyk discloses:

FIG. 3 is a diagram illustrating a preferred structure of a Request message 70. The Request message 70 includes a frame control field 72 ("FC"), a bandwidth request field 74 ("REQ"), a service identifier field 76 ("SID"), and a MAC header check sequence field 78 ("HCS"). Descriptions for the Request message 70 fields are shown in Table 1.

TABLE 1

Request message 70 Parameter	Description
FC 72 Frame control.	Identifies type of MAC message.
REQ 74	Total amount of bandwidth requested in mini-slots.
SID 76	Service Identifier for the cable modem 28 that sent the REQ message.
HCS 78	MAC header check sequence.

The SID 76 is a unique identifier for the cable modem 28 that is requesting permission to transmit. The SID 76 may be assigned by the CMTS 30 when the cable modem 28 initializes and registers with the CMTS 30 as discussed below. The REQ 74 field contains a measure of how much bandwidth, i.e. how many mini-slots, the cable modem 28 requests for the transmission of its data to the CMTS 30.

This section of Ruszczyk discloses the use of a request message for requesting bandwidth that includes a request parameter REQ 74 that specifies the total amount of bandwidth in mini-slots that a cable modem is requested from the CMTS. Thus, in this section of Ruszczyk, each cable modem specifically indicates a number of mini-slots requested for upstream transmission. The number of mini-slots requested by a given cable modem may not have anything to do with the speed of the cable modem. Therefore, this section of Ruszczyk does not necessarily disclose, or even suggest, the differentiation of slower cable modems from faster cable modems, as recited in claim 41.

At column 8, lines 49-56, Ruszczyk discloses:

The MAP message 80 informs the cable modems 28 of the allocation of mini-slots for a scheduled upstream usage interval and when to begin the usage interval. In a given upstream usage interval, selections of the cable modems 28 alternately transmit on the upstream channel. As is known in the art, each upstream usage interval is composed of transmission intervals, also referred to as "bursts," which comprise at least one mini-slot.

This section of Ruszczyk merely discloses the use of a MAP message for informing the cable modems of the allocation of mini-slots. This section of Ruszczyk does not suggest or disclose the differentiation of slower cable modems from faster cable modems, as recited in claim 41.

Further, Doshi does not cure the deficiencies of Ruszczyk and Office Action does not reference Doshi with respect to claim 41. In view of the remarks above, Applicant submits that neither Ruszczyk nor Doshi, either alone or in reasonable combination, discloses or suggests the combination of features recited in claim 41. Withdrawal of the rejection of this claim is, therefore, respectfully requested.

Further, claim 45 recites “receiving bandwidth requests from multiple ones of the cable modems” “for each of the bandwidth requests, determining a mini-slot size based on the modulation and symbol rate of the virtual upstream channel to which a respective cable modem is assigned” and “scheduling transmission on a physical channel from cable modems associated with each of the bandwidth requests based on a respective mini-slot size.” The Office Action (pg. 5-6) relies on column 7, lines 28-36 and column 9, lines 44-51 of Ruszczyk for allegedly disclosing these features.

At column 7, lines 28-36, Ruszczyk discloses:

A cable modem 28 typically transmits on an upstream channel during a transmission mini-slot allocated by the CMTS 30. The upstream channel may be viewed as time-divided into a stream of mini-slots, each of which is a unit of granularity for upstream transmission opportunities. The CMTS 30 also times the mini-slots to prevent collisions between the transmissions from different cable modems by instructing the cable modems 28 to transmit alternately during the mini-slots.

This section of Ruszczyk merely discloses the transmission of data, from a cable modem, on an upstream mini-slot allocated by a CMTS. This section, however, does not disclose or have anything to do with the determination of a mini-slot size. Thus, this section of Ruszczyk does not disclose or suggest, “determining a mini-slot size based on the modulation and symbol rate of the virtual upstream channel to which a respective cable modem is assigned,” as recited in claim 45.

At column 9, lines 44-51, Ruszczyk discloses:

Additionally, the cable modem 28 may transmit data packets in adjacent mini-slots according to different transmission formats for the RF interface 52. Associated with the formats are parameters for data transmission. In one exemplary preferred embodiment of the present invention, the parameters for upstream data transmission include the symbol rate, the upstream channel frequency, the modulation type, the preamble, and Forward Error Correction ("FEC") parameters as described in Table 3.



This section of Ruszczyk merely discloses the transmission of data in adjacent mini-slots with different transmission formats. Again, this section of Ruszczyk does not disclose or have anything to do with determining a mini-slot size. Thus, Ruszczyk does not disclose or suggest “determining a mini-slot size based on the modulation and symbol rate of the virtual upstream channel to which a respective cable modem is assigned,” as recited in claim 45.

In addition, Doshi does not cure the deficiencies of Ruszczyk and the Examiner has not alleged that Doshi discloses or suggests any portion of claim 45. In view of the remarks above, Applicant submits that neither Ruszczyk nor Doshi, alone or in any reasonable combination, discloses or suggests the combination of features recited in claim 45.

Therefore, withdrawal of the rejection of this claim is requested for at least this additional reason.

Although claims 46 and 53 have different scope than each other and claim 39, they include some similar recitations. For example, claim 46 recites “wherein the cable modems are grouped into the plurality of groups based on a latency associated with each of the plurality of groups.” Claim 53 recites “grouping cable modems into different groups based on latencies associated with the cable modems.” Therefore, claims 46 and 53 are allowable over Ruszczyk in view of Doshi for similar reasons to those set forth above with respect to claim 39. Applicant respectfully requests that the rejection of claims 46 and 53 under § 103(a) be withdrawn.

Claims 48-52 and 54-56 depend from claims 46 and 53, respectively. Therefore, these claims are allowable for at least the reasons set forth above with respect to claims 46 and 53. Thus, Applicant respectfully requests that the rejection of claims 48-52 and 54-56 under § 103(a) be withdrawn.

Although claim 57 is of different scope than claim 41, claim 57 includes some similar features including, “differentiating slower cable modems from faster cable modems in a cable network” and “assigning upstream bandwidth to the cable modems based on the differentiation such that the slower cable modems are allowed to transmit data on the upstream proportionately more frequently than faster cable modems.” This claim, therefore, patentably distinguishes over the cited references for at least the reasons set forth above with respect to claim 41. Applicant respectfully requests that the rejection of claim 57 under § 103(a) be withdrawn.

In view of the foregoing remarks, Applicant respectfully requests the Examiner's reconsideration of this application, and the timely allowance of the pending claims. If any questions remain, the Examiner is invited to contact the undersigned at the telephone number listed below.

U.S. Patent Application No. 10/032,622  
Confirmation No. 6016  
Attorney's Docket No. 0023-0142

To the extent necessary, a petition for an extension of time under 37 CFR § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 50-1070 and please credit any excess fees to such deposit account.

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Date: June 30, 2007

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